

REMARKS

Claims 2-15, 17, 19, and 20 are currently pending in the application. By this amendment, claims 1, 16, and 18 are canceled and claims 2, 8, 14, 19 and 20 are amended for the Examiner's consideration. The above amendments do not add new matter to the application and are fully supported by the specification. For example, support for the amendments is provided in the claims as originally filed.

Reconsideration of the rejected claims in view of the above amendments and the following remarks is respectfully requested.

Objection to Drawings

The drawings were objected to for allegedly using both reference characters "14" and "19" to designate opaque material. Applicants respectfully disagree.

Applicants submit that the reference character "19" is not used or shown in any of the figures. Thus it is impossible for "19" to be used to designate opaque material in the drawings. However, Applicants have amended the Specification to address a typographical error, which should adequately address the Examiner's objection.

Accordingly, Applicants respectfully request that the objection to the drawings be withdrawn.

35 U.S.C. §102 Rejection

Claims 1-8 were rejected under 35 U.S.C. §102(e) for being anticipated by U. S. Patent Application Publication No. 2004/0241579 issued to Hamada *et al.* ("HAMADA"). Claims 18-20 were rejected under 35 U.S.C. §102(b) for being anticipated by U. S. Patent No. 6,242,165 issued to Vaarstra ("VAARSTRA"). These rejections are respectfully traversed.

To anticipate a claim, each and every element as set forth in the claim must be found, either expressly or inherently described, in a single prior art reference. MPEP §2131. Applicants submit that the applied references do not disclose each and every feature of the claimed invention.

Claims 1-8

The Examiner asserts that HAMADA contains all of the features of the claimed invention. Applicants respectfully disagree.

The instant invention relates to a photoresist trimming process, and more particularly to a photoresist trimming process incorporating oxide gases in the etchant. Claim 2, which has been re-written in independent form to include the features of claim 1, recites in pertinent part:

... removing the resist foot found in the trench during a trimming process, wherein the trimming process comprises ionizing a portion of a mixture of gases comprising O₂ and at least one other oxide gas to form an etchant for the trimming process.

The Examiner is of the opinion that HAMADA shows these features in Paragraphs 0192-0194. Applicants respectfully disagree and submit that HAMADA does not disclose these features and, therefore, does not anticipate the claimed invention.

In fact, HAMADA discloses a pattern formation method that comprises etching. HAMADA discloses forming an organic film 23 on a substrate 22. A photoresist film 21 is formed on the organic film 23 (FIG. 1(a), Paragraph 0189). The organic film 23 is dry etched to transfer the resist pattern to the organic film 23 (FIG. 1(b), Paragraph 0191). The dry etching may be done with a mixture of oxygen gas and another gas such as CO₂ (Paragraphs 0191-0192). Prior to the oxygen gas etching, etching with chlorofluorocarbon gas can be conducted to remove scum from the resist after its development (Paragraph 0193). Thus, HAMADA teaches first using chlorofluorocarbon gas to remove resist scum, and in a separate step using oxygen gas to etch the organic material 23. Contrary to the Examiner's assertion, the etchant disclosed by HAMADA to remove resist scum is not a mixture of gases comprising O₂ and at least one other oxide gas. *Instead, HAMADA clearly discloses that a chlorofluorocarbon gas is used to remove resist scum.* Thus, HAMADA does not disclose removing the resist foot found in the trench during a trimming process, wherein the trimming process comprises ionizing a portion of a mixture of gases comprising O₂ and at least one other oxide gas to form an etchant for the trimming process, as recited in claim 2. Therefore, HAMADA does not contain each and every element of claim 2, and does not anticipate claim 2 and dependent claim 3-8.

Accordingly, Applicants respectfully request that the rejection over claims 2-8 be withdrawn.

Claims 18-20

The Examiner asserts that VAARSTRA contains all of the features of the claimed invention. Applicants respectfully disagree.

Claim 19, which has been re-written in independent form to include the limitations of claim 18, recites in pertinent part:

... wherein the O₂ and at least one other oxide gas has a pressure ranging from about 1 mT to 1000 mT.

The Examiner is of the opinion that VAARSTRA shows these features in line 19 of column 5 through line 22 of column 6. Applicants respectfully disagree and submit that VAARSTRA does not disclose these features and, therefore, does not anticipate the claimed invention.

In fact, VAARSTRA discloses the use of supercritical compositions for the removal of organic material. The composition includes at least one oxidizer (e.g., O₂) in the supercritical state (col. 5, lines 20-31). The composition may also include another supercritical component (e.g., CO₂) (col. 5, lines 40-55). VAARSTRA teaches that a gas enters the supercritical state when its combination of pressure and temperature is above the critical state (col. 4, lines 58-60). VAARSTRA does not teach that the composition has a pressure ranging from about 1 mT to 1000 mT, as recited in the

claimed invention. Instead, VAARSTRA provides exemplary pressures of the component gases of the composition of 72.8 atmospheres (atm) and 83.8 atm (col. 4, lines 60-67; col. 10, lines 10-26). Applicants submit that 1.0 atm equals approximately 7.6×10^5 milliTorr (mT). Thus, the 72.8 atm disclosed by VAARSTRA equals approximately 5.5×10^7 mT, and is not even remotely close to the recited range of 1 mT to 1000 mT. Contrary to the Examiner's assertion, VAARSTRA simply does not disclose a gas comprising O₂ and at least one other oxide gas wherein the O₂ and at least one other oxide gas have a pressure ranging from about 1 mT to 1000 mT, as recited in the claimed invention. Therefore, VAARSTRA does not contain every feature of claim 19 and does not anticipate claim 19 and dependent claim 20.

Accordingly, Applicants respectfully request that the rejection over claims 19-20 be withdrawn.

35 U.S.C. §103 Rejection

Claims 9-13 were rejected under 35 U.S.C. §103(a) for being unpatentable over HAMADA in view of VAARSTRA. Claims 14-17 were rejected under 35 U.S.C. §103(a) for being unpatentable over U. S. Patent Application Publication No. 2005/0045799 issued to Deng *et al.* ("DENG") in view of VAARSTRA. These rejections are respectfully traversed.

The Examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the

references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP §2142.

Claims 9-13

Applicants respectfully submit that claims 9-13 depend from allowable independent claim 2, and are allowable by virtue of the allowability of the independent claim.

Accordingly, Applicants respectfully request that the rejection over claims 9-13 be withdrawn.

Claims 14-17

The Examiner asserts that DENG and VAARSTRA teach or suggest all of the features of the claimed invention, and that it would have been obvious to combine the references. Applicants respectfully disagree.

Claim 14, which has been amended to include the features of claim 16, recites in pertinent part:

... forming a trimming gas by mixing O₂ and at least one other oxide gas at a pressure ranging from about 1 mT to 1000 mT; and
trimming an etched mask with a the trimming gas comprising O₂ and at least one other oxide gas.

The Examiner admits that DENG does not teach the step of trimming an etched mask with a trimming gas comprising O₂ and at least one other oxide gas. Applicants agree that DENG does not show this feature. The Examiner is of the opinion that VAARSTRA shows this feature, and that VAARSTRA discloses that forming the trimming gas comprises mixing O₂ and at least one other oxide gas at a pressure ranging from about 1 mT to 100 mT in line 19 of column 5 through line 22 of column 6. Applicants respectfully disagree.

Contrary to the Examiner's assertion, VAARSTRA does not teach or suggest forming a trimming gas at the recited pressure. Instead, as discussed above, VAARSTRA discloses a gas mixture with pressures of approximately 5.5×10^7 mT. Neither DENG nor VAARSTRA disclose forming a trimming gas by mixing O₂ and at least one other oxide gas at a pressure ranging from about 1 mT to 1000 mT, as recited in claim 14. Thus, the references, alone or in combination, do not teach or suggest each and every element of claim 14 and dependent claims 15 and 17.

Accordingly, Applicants respectfully request that the rejection over claims 14, 15, and 17 be withdrawn.

Other Matters

The specification has been amended to correct a typographical error.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicants hereby make a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 09-0456.

Respectfully submitted,
Shaun CRAWFORD

A handwritten signature in black ink, appearing to read "Andrew M. Calderon", is written over a horizontal line. The signature is fluid and cursive, with a large, stylized 'A' at the beginning.

Andrew M. Calderon
Reg. No. 38,093

April 10, 2006
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
(703) 716-1191